Pruski. J.F. and R.L. Hartman. 2012. Synopsis of *Leucosyris*, including synonymous *Arida* (Compositae: Astereae). Phytoneuron 2012-98: 1–15. Published 12 November 2012. ISSN 2153 733X

SYNOPSIS OF *LEUCOSYRIS*, INCLUDING SYNONYMOUS *ARIDA* (COMPOSITAE: ASTEREAE)

JOHN F. PRUSKI
Missouri Botanical Garden
P.O. Box 299
St. Louis, Missouri 63166

RONALD L. HARTMAN
Department of Botany
University of Wyoming
Laramie, Wyoming 82070

ABSTRACT

The genus *Leucosyris* is revived, reviewed, and expanded to include nine species from the southwestern USA and northern Mexico. *Arida* is reduced to synonymy of *Leucosyris*, and eight new combinations in *Leucosyris* are proposed.

KEY WORDS: *Arida*, Asteraceae, Astereae, Compositae, *Leucosyris*, *Machaeranthera*, *Psilactis*.

A generic review of the mostly radiate-capitulate *Machaeranthera* Nees alliance (Morgan and Hartman 2003) recognized the aptly named *Arida* (R.L. Hartm.) D.R. Morgan & R.L. Hartm. (Compositae: Astereae: Machaerantherinae), but did not emphasize that included within *Arida* was the type (*Linosyris carnosa* A. Gray) of *Leucosyris* Greene (5 Aug 1897). Here, we emend that work by reducing *Arida* to taxonomic synonymy of a reinstated *Leucosyris*, a name which has priority over *Arida* by more than a century. We also provide a synopsis of *Leucosyris* and its nine species, abbreviated synonymy and typology, and eight new combinations in *Leucosyris*. As an aside, the illegitimate later homonym *Linosyris* Cass. (1825; non *Linosyris* Ludw., 1757, Santalaceae) is unavailable nomenclaturally and not congeneric taxonomically with our plants, but rather the Cassini name is typified by European material. It appears that the available name *Leucosyris* has often stood in the shadows, this perhaps a by-product of its type being described in *Linosyris*.

Machaeranthera was described by Nees (1832) and accepted by Candolle (1836) and Gray (1852, 1853). Bentham and Hooker (1873) reduced *Machaeranthera* to *Aster* sect. *Machaeranthera* (Nees) Benth. & Hook. f., in which Gray (1884) recognized seven species. *Machaeranthera* was reinstated as a genus by Greene (1896), and Greene (1899) recognized about two dozen species, these mostly taprooted and blue-rayed. Shinners (1950) expanded *Machaeranthera* to include a few yellow-rayed species, but these yellow-rayed species were excluded from *Machaeranthera* by Cronquist and Keck (1957). Hartman (1976, 1990) reviewed *Machaeranthera* and recognized 36–38 species spread unequally among two subgenera and eight sections. Most of the species recognized by Hartman (1976, 1990) as *Machaeranthera* (i.e., *M.* subg. *Machaeranthera*) were characterized by having taproots, bristled- or pinnatilobed leaves, ray florets with blue to less commonly white corollas, and base chromosome numbers of $x = 4$, 5, or 6, but the handful of species placed in *M.* subg. *Sideranthus* were yellow-rayed. Hartman (1976, 1990) recognized only two species of *M.* sect. *Machaeranthera*, and the larger sections he recognized included sect. *Blepharodon* (with nine species) and the newly described blue-rayed sect. *Arida* (with eight species).

At about the same time that Greene (1896, 1899) resurrected *Machaeranthera,* he (Greene 1897a) described *Leucosyris* to accommodate a single discoid species. *Leucosyris* (or its type, *Linosyris carnosa*, albeit often as *Aster intricatus*) was subsequently recognized as including only

Leucosyris (Chloracantha) spinosa (Benth.) Greene by Wooton and Standley (1915), but treated within *Aster* by Hall (1907), Blake (1925, 1942), Jepson (1925), Tidestrom and Kittell (1941), Munz and Keck (1959), Ferris (1960), Shreve and Wiggins (1964), Munz (1974), Jones (1980), and Semple and Brouillet (1980). More recently, *Leucosyris was* recognized as monotypic by Sundberg (1986), with two species by Gandhi and Thomas (1989), *L. carnosa* was placed within *Machaeranthera* by Hartman (1976, 1990), Nesom (1989), Nesom et al. (1991), Keil et al. (1993), and Felger (2000), but *Leucosyris* was reinstated by Cronquist (1994), again as monotypic.

Morgan and Hartman (2003) summarized the recent dismantling of *Machaeranthera*, which they recognized in the narrow sense as containing only the two species of *M.* sect. *Machaeranthera* sensu Hartman (1976, 1990). Most former *Machaeranthera* species were treated by Morgan (1993) and Morgan and Hartman (2003) variously among resurrected *Dieteria* Nutt. (x = 4; 3 spp.), *Psilactis* A. Gray (x = 3, 4, 9; 6 spp.), *Xanthisma* DC. (x = 2, 3, 4, 8; 17 spp., including yellow-rayed subg. *Sideranthus* as well as sect. *Blepharodon*), and the newly elevated *Arida*. Nesom and Robinson (2007) placed most of these genera into subtribe Machaerantherinae, but by non-bristle tipped leaf teeth and chromosome number they treated *Psilactis* as Symphyotrichinae. We recognize *Leucosyris* (x = 5; 9 spp.) in the same sense that Morgan and Hartman (2003), Hartman and Bogler (2006), and Nesom and Robinson (2007) circumscribed *Arida*, despite the discrepancies between cpDNA and nrDNA studies (nrDNA studies place *L. parviflora* and *L. riparia* in different subclades), which Morgan and Hartman (2003) attributed to reticulate evolution.

LEUCOSYRIS Greene, Fl. Francisc. 384. (5 Aug) 1897. **TYPE**: *Linosyris carnosa* A. Gray (≡ *Leucosyris carnosa* (A. Gray) Greene).

Machaeranthera sect. *Arida* R.L. Hartm., Phytologia 68: 446. 1990. *Arida* (R.L. Hartm.) D.R. Morgan & R.L. Hartm., Sida 20: 1410. 2003. **TYPE**: *Machaeranthera arida* B.L. Turner & D.B. Horne (≡ *Leucosyris arida* (B.L. Turner & D.B. Horne) Pruski & R.L. Hartm.).

Annual or biennial herbs to short-lived perennial weak subshrubs 10–80(–150) cm tall, usually taprooted, infrequently rhizomatous; stems usually ascending to erect; herbage (when glandular) usually with short stipitate-glands. **Leaves** alternate, the basal (often withered) often petiolate, the cauline sessile and commonly clasping, entire to bipinnatifid, lobes or teeth often hyaline bristle-tipped, never sharply bristle-tipped, surfaces glabrous or pubescent, sometimes stipitate-glandular. **Capitulescence** corymbiform to open-cymose, capitula monocephalous on branchlets; peduncles often with bracteoles loosely grading into phyllaries. **Capitula** radiate (heterochromous) or infrequently discoid; involucre turbinate to hemispherical; phyllaries mostly 40+, imbricate, graduated, 3–8-seriate, persistent, linear-lanceolate to narrowly oblong, stiff, base usually indurate and stramineous, apex often with dark green to purplish mid-zone or more commonly patch, abaxial surface glabrous to pubescent or glandular; receptacle epaleate, convex, somewhat alveolate. **Ray florets** (0 or)8–50+, pistillate, 1-seriate; corolla limb usually pale blue to dark blue (infrequently white), usually drying brownish-yellow, often coiling when old or pressed. **Disk florets** (5–)10–100+, bisexual; corolla gradually narrow-funnelform, 5-lobed, yellow, lobes triangular; anthers pale, appendage lanceolate; style branch appendage narrowly triangular, papillose. **Cypselae** weakly dimorphic, those of the rays subtriquetrous, those of the rays disks subcompressed, narrowly oblong, stramineous to pale brownish, faces 7–13-striatulate, sericeous, distal trichomes of disk cypselae often reaching to pappus bristle base; pappus of many stramineous filiform capillary scabrid bristles, bristles contiguous basally, indistinctly ca. 2-seriate, disks always pappose, rays pappose or epappose. x = 5.

Leucosyris as treated here in the expanded sense basically may be thought of as a segregate of *Machaeranthera*. Indeed, revisionary treatments of three of its species by Turner and Horne (1964) as sect. *Psilactis* and of a fourth (*L. blepharophylla* as *M. gypsitherma*) by Nesom et al. (1990) as

sect. *Arida* were each under the umbrella of *Machaeranthera*. The base chromosome number of *Leucosyris* is $x = 5$ and its species mostly have been reported under names in *Machaeranthera* (e.g., Arnold and Jackson 1978 and Turner et al. 1975). However, *Machaeranthera* in the strict sense differs from *Leucosyris* by a base chromosome number of $x = 4$ and by sharply bristle-tipped leaf lobes. Genera in which the basionyms of our nine recognized species were described include *Arida* (1 sp.), *Aster* (2 spp.), *Linosyris* (1 sp.), *Machaeranthera* (3 spp.), and *Psilactis* (2 spp.). Attempted lectotypifications of a few names based on sheets taken here as Asa Gray holotypes have been hazarded elsewhere, but none affect any species circumscriptions. The nine species of *Leucosyris* are mostly summer- or late-blooming and occur from sea-level to about 2200 meters elevation in salt flats, scrub lands, dunes, deserts, sulphur pools, limestone hills, cliff faces, or less commonly along streamsides or in flood plains of the southwestern USA and northern Mexico, with only *L. riparia* (Kunth) Pruski & R.L. Hartm occurring as far south as Durango and Zacatecas (and perhaps Guanajuato), Mexico, near the Tropic of Cancer.

Etymology: The name *Leucosyris* Greene is derived from *Linosyris* Cass., which is typified by *Chrysocoma linosyris* L. (now *Crinitaria linosyris* (L.) Less.). The Linnaean epithet alludes to the resemblance of the linear-leaved composite to the subsucculent-leaved European–African Santalaceae genus *Osyris* L. Indeed, the protologue of *C. linosyris* cited the pre-Linnaean 1601 Clusius usage of *Osyris austriaca* as an original element of the composite. Jackson (1987) and Hyam and Pankhurst (1995) noted that *Osyris* (used by Bauhin, Dioscorides, Pliny, van Royen, etc.) is derived from the Greek *ozos*, in reference to the dense branching of the Santalaceae genus. The name *Leucosyris*, derived from *ozos*, is thus not a homonym of *Leucoseris* Nutt., wherein the suffix *seris* (Brown 1956) is a Latin word for "a kind of endive."

KEY TO SPECIES OF LEUCOSYRIS

1. Capitula discoid (sparsely leafy to nearly leafless wiry-reedy or rounded and tumbleweed-like subshrubby herbs) ..... **Leucosyris carnosa**
1. Capitula radiate.

    2. Ray cypselae pappose.

        3. Cauline leaves entire, subsucculent.

            4. Caespitose perennials; leaf margins 8–20-spinulose-ciliate, spinules 0.4–1.5 mm long; involucres 5–8 mm diam. ..... **Leucosyris blepharophylla**
            4. Annual leaf-stemmed herbs; leaf margins sometimes soft-ciliate; involucres 10–16 mm diam. ..... **Leucosyris riparia**

        3. Cauline leaves (mostly) pinnatilobed to 2-pinnatifid, chartaceous.

            5. Receptacles 2–7 mm diam.; phyllary apices mostly appressed ..... **Leucosyris parviflora** (in part)
            5. Receptacles 8–11 mm diam.; phyllary apices spreading to reflexed ..... **Leucosyris turneri**

    2. Ray cypselae usually epappose.

        6. Basal rosette persistent ..... **Leucosyris mattturneri**
        6. Basal leaves usually absent at anthesis.

7. Herbage densely stipitate-glandular (at least some cauline leaves pinnatilobed).

8. Herbage heterotrichous; involucres 3.5–6 × 5–9 mm; disk pappus bristles ca. 2 mm long, about half as long as disk corollas ..... **Leucosyris arida**
8. Herbage homotrichous; involucres 6–8 × 10–15 mm; disk pappus bristles 3–3.5 mm long, more than half as long as disk corollas ..... **Leucosyris crispa**

7. Herbage essentially glabrous to sparsely glandular.

9. Cauline leaves entire to shallow-toothed ..... **Leucosyris coulteri**
9. Cauline leaves usually pinnatilobed to 2-pinnatifid ..... **Leucosyris parviflora** (in part)

LEUCOSYRIS ARIDA (B.L. Turner & D.B. Horne) Pruski & R.L. Hartm., comb. nov. *Machaeranthera arida* B.L. Turner & D.B. Horne, Brittonia 16: 324. 1964. *Machaeranthera coulteri* var. *arida* (B.L. Turner & D.B. Horne) B.L. Turner, Phytologia 61: 144. 1986. **TYPE: USA. California**. San Bernardino Co.: Mesquite Valley, 15 May 1941, *Wolf 10635* (holotype: DS; isotypes: CAS, NY, RSA, TEX-2, UC). Figure 1.

Arida arizonica (R.C. Jacks. & R.R. Johnson) D.R. Morgan & R.L. Hartm.; *Machaeranthera ammophila* Reveal; *Machaeranthera arizonica* R.C. Jacks. & R.R. Johnson

Annual low-rounded taprooted herbs 5–30(–40) cm tall; stems 1(–6), moderately branched and leafy throughout, branches spreading-ascending; herbage densely short-stipitate-glandular, sometimes heterotrichous and also sparsely pilose-villous. **Leaves**: basal usually absent at anthesis; cauline 1–5 cm long, oblong in outline, margins entire to more commonly at least some pinnatilobed, apical mucro of lobes and teeth (usually 2–5 per side) about as long as or slightly longer than the stipitate-glands. **Capitula** radiate; involucre 3.5–6 × 5–9 mm, hemispherical; phyllaries 2–4-seriate. **Ray florets** 20–40; corolla limb 5–8 mm long. **Disk florets** 28–60; corolla 4–6 mm long. **Cypselae** 1.4–2 mm long, rays epappose, disk pappus bristles ca. 2 mm long, about half as long as disk corollas. $2n = 10$.

Distribution. USA (Arizona, California, Nevada) and Mexico (Sonora); 0–1000 meters elevation.

Turner and Horne (1964) and Munz (1974) noted that the name *Psilactis coulteri* was often misapplied to *Leucosyris arida* (e.g., Hall 1907; Munz and Keck 1959; Ferris 1960). The name *Arida arizonica,* based on the senior synonym, was used by Morgan and Hartman (2003) for this taxon. Line drawings of *Leucosyris arida* were provided by Ferris (1960, as *Psilactis coulteri*), Keil et al. (1993, as *M. arida*), Felger (2000, as *M. coulteri* var. *arida*), Hartman and Bogler (2006, as *Arida arizonica*), and Keil et al. (2012, as *A. arizonica*).

LEUCOSYRIS BLEPHAROPHYLLA (A. Gray) Pruski & R.L. Hartm., comb. nov. *Aster blepharophyllus* A. Gray, Smithsonian Contr. Knowl. [Plantae Wrightianae II] 5(6): 77. 1853. *Machaeranthera gypsitherma* Nesom, Vorobik & Hartman, Syst. Bot. 15: 638. 1990 (non *M. blephariphylla* (A. Gray) Shinners, basionym in *Haplopappus*). *Arida blepharophylla* (A. Gray) D.R. Morgan & R.L. Hartm., Sida 20: 1413. 2003. **TYPE: USA. New Mexico**. Hidalgo Co.: Las Playas Springs, 7 Oct 1851, *Wright 1164* (holotype: GH; isotypes, CGE, GH, MO, NY, P, PH, US). Figure 2.

Caespitose perennial rhizomatous herbs 4–35 cm tall; stems 4–12+ from woody crown, sparingly branched in distal half, branchlets somewhat fastigiate, erect-ascending; herbage glabrous or nearly so. **Leaves** dimorphic, basal and cauline; basal present at anthesis, in compact persistent rosette, sessile, 1–4 cm long, linear-spatulate, subsucculent, base clasping, margins entire, 8–20-spinulose-ciliate, spinules 0.4–1.5 mm long, subequal, sometimes as long as blade width; cauline abruptly reduced and scale-like. **Capitula** radiate; involucre 7–10 × 5–8 mm, turbinate; phyllaries 4–6-seriate; receptacle often noticeable alveolate with lacerate borders to 0.5 mm tall. **Ray florets** 8–14; corolla limb 8–10 mm long. **Disk florets** 12–20+; corolla 4.5–5.5 mm long. **Cypselae** 1.7–2.4 mm long, rays pappose. $2n = 10$.

Missouri Botanical Garden
48573
Herbarium
15213 PLANTS OF SOUTHERN CALIFORNIA.
No. 1252.
Aster parviflorus, Gray.
(§. Machaeranthera.)
Warm springs, Mojave Desert.
May, 1882.
Coll. S. B. & W. F. Parish, San Bernardino.
Leucosyris arida (Turner & Horne) Pruski & R.L. Hartm.
det. John Pruski (MO), 2012
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)
Mo. Bot. Garden,
1897.
MISSOURI BOTANICAL GARDEN
copyright reserved
cm 0 1 2 3 4 5 6 7 8 9 10

Figure 1. Representative specimen of *Leucosyris arida* (B.L. Turner & D.B. Horne) Pruski & R.L. Hartm. (*Parish & Parish 1252*, MO; this collection was cited by Hall 1907 as *Psilactis coulteri*).

Figure 2. Isotype of *Aster blepharophyllus* A. Gray (≡ *Leucosyris blepharophylla* (A. Gray) Pruski & R.L. Hartm.). (*Wright 1164,* MO).

Distribution. USA (New Mexico, Texas) and Mexico (Chihuahua); 1200–2200 meters elevation.

Leucosyris blepharophylla was described by Gray (1853) in *Aster* sect. *Oxytripolium* (DC.) Torr. & A. Gray. The orthography of the epithet is retained as it may refer to the dense cloaking leaf rosettes or to leaves resembling sect. *Blepharodon*, although as likely it may refer to the leaves with marginal leaf spinules similar to those of African *Blepharis* Juss. (Acanthaceae). Nesom et al. (1990) provided a line drawing under the name of *Machaeranthera gypsitherma*.

LEUCOSYRIS CARNOSA (A. Gray) Greene, Fl. Francisc. 384. (5 Aug) 1897. *Linosyris carnosa* A. Gray, Smithsonian Contr. Knowl. [Plantae Wrightianae II] 5(6): 80. 1853. *Bigelowia carnosa* (A. Gray) Benth. & Hook. f., Gen. Pl. 2: 255. 1873. *Aster carnosus* (A. Gray) A. Gray ex Hemsl., Biol. Cent.-Amer., Bot. 2: 120. 1881 (non Gilib. 1781). *Machaeranthera carnosa* (A. Gray) G.L. Nesom, Phytologia 67: 439. 1989. *Arida carnosa* (A. Gray) D.R. Morgan & R.L. Hartm., Sida 20: 1413. 2003. **TYPE: USA. Arizona**. Cochise Co.: south of Willcox Playa [fide Sundberg 1986; protologue locality as "west of the Chiricahua Mts., Sonora" and collection number originally *489*], 6 Sep 1851, *Wright 1187* (holotype: GH; isotypes: GH, MO, PH, US-2). Figure 3.

Aster intricatus (A. Gray) S.F. Blake; *Bigelowia intricata* A. Gray; *Leucosyris carnosa* var. *intricata* (A. Gray) Cronquist; *Machaeranthera carnosa* var. *intricata* (A. Gray) Nesom

Sparsely leafy to nearly leafless wiry-reedy or rounded and tumbleweed-like perennial rhizomatous subshrubby herbs 0.3–1(–1.4) m tall; stems 1–several, moderately to intricately divaricate-branched throughout or only so somewhat above base, stiff, inconspicuously leafy distally, distal branches sometimes nearly fastigiate, ascending with branches and branchlets spreading, pale green; herbage glabrous and leaves glaucous. **Leaves**: basal absent at anthesis; cauline mostly distal, often quickly deciduous, spreading to nearly appressed, inconspicuous, well-spaced and scale-like, 0.3–2 cm long, narrowly lanceolate or narrowly oblanceolate, subsucculent, margins entire, apex apiculate. **Capitula** discoid; involucre 5–8 × 4–7 mm, turbinate to turbinate-campanulate; phyllaries strongly graduated, 4–6-seriate, dark mid-zone often narrow, some subcuspidate. **Ray florets** absent. **Disk florets** (5–)10–30(–40); corolla 5–7 mm long. **Cypselae** 2.5–4 mm long, pappose. $2n = 10$.

Distribution. USA (California, Arizona, Nevada) and Mexico (Sonora), often growing in otherwise basically barren ground; 100–1600 meters elevation.

Gray (1852, 1853) treated eight species in *Linosyris* (20+ American species have at one time or another been placed in *Linosyris*), described ours as *"L. ? carnosa,"* and mentioned that it looked like "a *Tripolium* without rays." *Leucosyris carnosa* (the generitype), especially the nearly leafless *Bigelowia intricata* phase, brings to mind leafless *Chloracantha spinosa*, also placed by Greene (1897b) into *Leucosyris*. However, the more widespread *Chloracantha* Nesom et al. ranges from Louisiana to California and south from Mexico and Guatemala to Costa Rica and western Panama, and differs from *Leucosyris* by a base chromosome number of $x = 9$, thorny stems, short-radiate capitula, and glabrous cypselae. Line drawings of *Leucosyris carnosa* were provided by Ferris (1960, as *Aster intricatus*), Sundberg (1986, as *L. carnosa*), Cronquist (1994, as *L. carnosa* var. *intricata*), and Keil et al. (2012, as *Arida carnosa*).

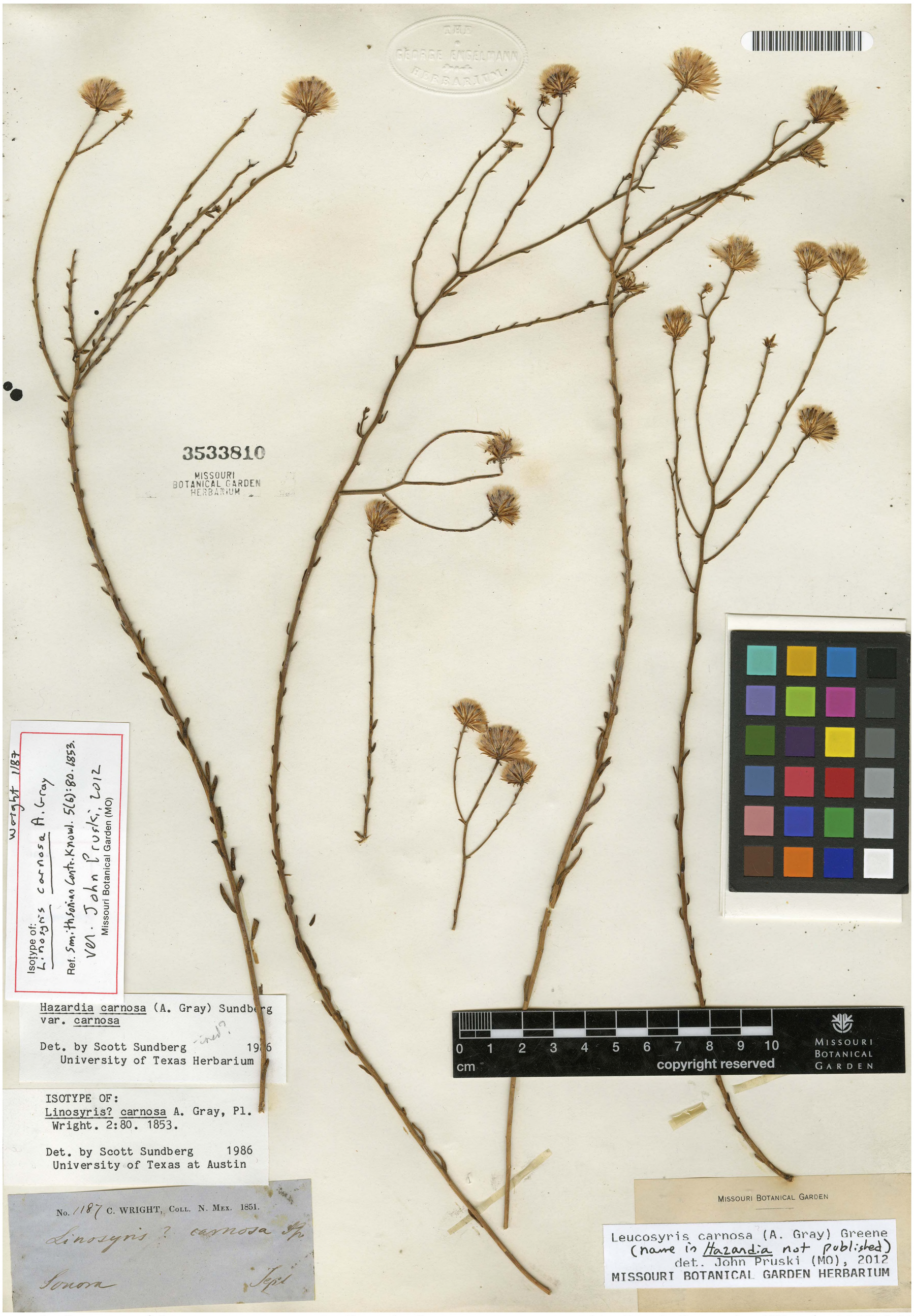

Figure 3. Isotype of *Linosyris carnosa* A. Gray (≡ *Leucosyris carnosa* (A. Gray) Greene). (*Wright 1187,* MO).

Figure 4. Representative specimen of *Leucosyris crispa* (Brandegee) Pruski & R.L. Hartm. (*Hartman et al. 3524*, MO).

LEUCOSYRIS COULTERI (A. Gray) Pruski & R.L. Hartm., comb. nov. *Psilactis coulteri* A. Gray, Mem. Amer. Acad. Arts, n.s. [Plantae Fendlerianae] 4(1): 72. 1849. *Machaeranthera coulteri* (A. Gray) B.L. Turner & D.B. Horne, Brittonia 16: 322. 1964. *Arida coulteri* (A. Gray) D.R. Morgan & R.L. Hartm., Sida 20: 1414. 2003. **TYPE: MEXICO. Sonora**. Probably near the coast by Guaymas, s.d., *Coulter 295* (holotype: GH p.p., right-hand side; mounted on the same sheet towards the left is *Gregg 409*, which belongs to a different taxon).

Wiry-reedy perennial taprooted herbs 15–45 cm tall; stems few-branched, weakly ascending to procumbent, nearly leafy throughout or only distally so; herbage sparsely to moderately sessile-glandular (homotrichous) or stems nearly glabrous. **Leaves**: basal usually absent at anthesis; cauline 0.5–3 cm long, linear-lanceolate, margins entire to shallow-toothed. **Capitula** radiate; involucre 8–10(–11) × 5–8 mm, hemispherical; phyllaries ca. 40, 3–5-seriate. **Ray florets** ca. 33; corolla limb 5–8 mm long. **Disk florets** 40–60; corolla 3.5–4 mm long. **Cypselae** 1–1.5 mm long, rays (usually) epappose. $2n = 10$.

Distribution. Mexico (Sonora); 0–100 meters elevation.

Leucosyris coulteri was one of the two original species, but not the type, of *Psilactis* A. Gray (1849).

LEUCOSYRIS CRISPA (Brandegee) Pruski & R.L. Hartm., comb. nov. *Psilactis crispa* Brandegee, Proc. Calif. Acad. Sci., ser. 2, 2: 169. 1889. *Machaeranthera crispa* (Brandegee) B.L. Turner & D.B. Horne, Brittonia 16: 321. 1964. *Arida crispa* (Brandegee) D.R. Morgan & R.L. Hartm., Sida 20: 1414. 2003. **TYPE: MEXICO. Baja California Sur**. San Ignacio, 1 Apr 1889, *Brandegee s.n.* (holotype: UC; isotypes: GH, PH, US). Fig. 4.

Annual or short-lived perennial herbs 20–50 cm tall, from thick taproot; stems 1–few from base, ascending to erect, fairly leafy and moderately branched throughout, mid-stems homotrichous with stipitate-glandular trichomes, branches ascending; herbage densely stipitate-glandular, homotrichous. **Leaves**: basal absent at anthesis; cauline 0.5–4 cm long, linear-oblong, few-pinnatilobed about halfway to midrib, lobes (teeth) well-spaced. **Capitula** radiate; involucre 6–8 × 10–15 mm, hemispherical; phyllaries 3–5-seriate, apex sometimes spreading. **Ray florets** 30–40; corolla limb 6–8 mm long. **Disk florets** 40–60; corolla 3.8–6 mm long. **Cypselae** 2–2.4 mm long, rays usually epappose, disk pappus bristles 3–3.5 mm long, more than half as long as disk corollas. $2n = 10$.

Distribution. Mexico (Baja California Sur, Sonora; *Leucosyris crispa* was given as endemic to Baja California Sur by Shreve and Wiggins (1964) and Wiggins (1980), but Hartman (1976, 1990) and Felger (2000) gave it as also occurring in coastal Sonora; 50–170 meters elevation.

LEUCOSYRIS MATTTURNERI (B.L. Turner & G.L. Nesom) Pruski & R.L. Hartm., comb. nov. *Arida mattturneri* B.L. Turner & G.L. Nesom, Sida 20: 1418. 2003. **TYPE: USA. Texas.** Presidio Co.: ca. 2.2 miles NNW of Ruidosa, 20 Jul 2003, *Turner 100* (holotype: TEX; isotype: NY).

Perennial subcaespitose taprooted herbs 50–80 cm tall, from persistent basal rosette; stems several, much-branched, erect or ascending, sparsely leafy, stiff; herbage sessile-glandular or short-stipitate-glandular, viscid. **Leaves** basal and cauline, surfaces densely glandular, basal rosette leaves persistent, 4–6 cm long, bipinnatifid, oblanceolate to broadly obovate in outline, basal ones abruptly grading into cauline, these linear-oblanceolate. 1-pinnatilobed to toothed or entire, ultimate ones scale-like. **Capitula** radiate; involucre 5–6 × 6–8 mm, hemispherical; phyllaries 5–6-seriate, oblong-

lanceolate, at least the outer with apices spreading. **Ray florets** 9–13; corolla 10–12 mm long, limb 9–10 mm long. **Disk florets** 40–100; corolla 3.5–4.5 mm long. **Cypselae** 1–1.5 mm long, rays epappose. $2n = 10$.

Distribution. USA (Texas) and expected in adjacent Mexico (Chihuahua, Coahuila); 1400–1500 meters elevation.

Turner and Nesom (2003) provided both habit and floral photographs of *Leucosyris mattturneri*.

LEUCOSYRIS PARVIFLORA (A. Gray) Pruski & R.L. Hartm., comb. nov. *Machaeranthera parviflora* A. Gray, Smithsonian Contr. Knowl. [Plantae Wrightianae I] 3(5): 90. 1852. *Aster parviflorus* (A. Gray) A. Gray, Bot. California 1: 322. 1876 (non *A. parviflorus* Nees 1832). *Aster parvulus* S.F. Blake, Contr. U.S. Natl. Herb. 25: 563. 1925 (non *A. parviflorus* Nees 1832). *Arida parviflora* (A. Gray) D.R. Morgan & R.L. Hartm., Sida 20: 1414. 2003. **TYPE: USA. New Mexico**. Along the Rio Grande, Sep 1849, *Wright 271* (holotype: GH; isotypes: BM, NY, P, US).

Aster tanacetifolius var. *pygmaeus* (A. Gray) A. Gray; *Machaeranthera pygmaea* (A. Gray) Woot. & Standl.; *Machaeranthera tanacetifolia* var. *pygmaea* A. Gray

Annual, biennial, or short-lived perennial taprooted herbs 10–30(–40) cm tall; stems 1–several from sometimes woody taproot, moderate-branched and leafy throughout, erect or ascending; herbage glabrous to sparsely stipitate-glandular and then somewhat viscid. **Leaves**: basal absent at anthesis; cauline 1–3 cm long, lanceolate to oblong, chartaceous, base often clasping, margins usually few-pinnatilobed to 2-pinnatifid (sometimes distal stem leaves nearly entire to shallowly pinnatilobed), the distal ones weakly spreading or more commonly ascending. **Capitula** radiate; involucre 3–5 × 4–6 mm, hemispherical; phyllaries 3–4-seriate, minutely glandular, apices mostly appressed; receptacle 2–7 mm diam. **Ray florets** 10–32; corolla limb 6–8 mm long. **Disk florets** 18–40+; corolla 3.5–4.5(–5) mm long. **Cypselae** 1.5–2 mm long, rays pappose or epappose. $2n = 10$.

Distribution. USA (Arizona, Colorado, New Mexico, Texas, Utah) and Mexico (Chihuahua, Coahuila); 1100–1700 meters elevation.

Leucosyris parviflora was illustrated by Martin and Hutchins (1988), Cronquist (1994), and Ivey (2003) as *Machaeranthera parviflora*.

LEUCOSYRIS RIPARIA (Kunth) Pruski & R.L. Hartm., comb. nov. *Aster riparius* Kunth, Nov. Gen. Sp. (folio ed.) 4: 72. 1820[1818]. *Machaeranthera riparia* (Kunth) A.G. Jones, Syst. Bot. 8: 85. 1983. *Arida riparia* (Kunth) D.R. Morgan & R.L. Hartm., Sida 20: 1414. 2003. **TYPE: MEXICO.** "Crescit in humidis juxta lacum Cuiseo" (given in Stearn 1968 as Cuitzeo and visited in Sep 1803, see below), *Humboldt & Bonpland s.n.* (*4308*) (holotype: P-HBK; isotypes: B-W 15821, P). Figure 5.

Aster sonorae A. Gray; *Machaeranthera sonorae* (A. Gray) Stucky

Wiry-reedy annual taprooted herbs 25–60 cm tall; stems 1–several, moderately-branched distal in 2/3, erect to sometimes procumbent, leafy throughout, stiff, branches strongly ascending, sometimes striped (costae pale) longitudinally; herbage glabrous or nearly so. **Leaves** mostly cauline, strongly ascending to distal ones nearly appressed, sessile, 0.5–3 cm long, oblanceolate, lanceolate to oblong, subsucculent, broad-based, margins entire, sometimes soft-ciliate, apex mucronate. **Capitula**

radiate; involucre 10–12 × 10–16 mm, hemispherical; phyllaries 5–8-seriate, some attenuate. **Ray florets** 30–50+; corolla limb 8–11 mm long, sometimes white. **Disk florets** (25–)40–80+; corolla 3.5–5 mm long, lobes sometimes long-triangular. **Cypselae** 2–3 mm long, rays pappose. $2n = 10$.

Figure 5. Isotype of *Aster sonorae* A. Gray (= *Leucosyris riparia* (Kunth) Pruski & R.L. Hartm.). (*Wright 1163*, MO).

Distribution. USA (Arizona and New Mexico, where sometimes hybridizing, fide Stucky 1978 and Hartman 1990, with *L. parviflora*) and Mexico (Chihuahua, Coahuila, Durango, Zacatecas, ?Guanajuato); 900–2000 meters elevation.

The protologue locality of Cuitzeo (as "Cuiseo") as given by Stearn (1968) was visited by Humboldt and Bonpland in September 1803. Modern gazetteers list place names of Cuitzeo in Guanajuato, Jalisco, and Michoacan. The possible Humboldt and Bonpland type collection locality near Laguna de Cuitzeo seems to be between northern Michoacan and Guanajuato, somewhat south of Durango and Zacatecas, the southern-most distribution of the species known to us. The northwestern-most Mexican localities visited by Humboldt and Bonpland are near Guanajuato (Stearn 1968), and McVaugh (1984) did not list this species for *Novo-Galicia*. We cannot place with any degree of certainty the type collection locality of *Aster riparius*.

Stucky (1978) discussed seven hybrids in the *Machaeranthera* group and noted that the highest pollen fertility observed was in hybrids between *L. parviflora* (as *M. parviflora*) and *L. riparia* (as *Aster sonorae*), prompting him to propose the combination *M. sonorae*. As noted by Morgan and Hartman (2003), the Stucky (1978) results strengthen the generic limits based on cpDNA evidence. *Aster sonorae* is usually treated in synonymy, but was resurrected by Turner et al. (1975), and reduced again by Jones (1983).

LEUCOSYRIS TURNERI (M.L. Arnold & R.C. Jacks.) Pruski & R.L. Hartm., comb. nov. *Machaeranthera turneri* M.L. Arnold & R.C. Jacks., Syst. Bot. 3: 209. 1978[1979]. *Arida turneri* (M.L. Arnold & R.C. Jacks.) D.R. Morgan & R.L. Hartm., Sida 20: 1414. 2003. TYPE: **MEXICO. Chihuahua**. 3.3. miles N of Meoqui, 1 Aug 1964, *Jackson 4005* (holotype: TTC).

Annual taprooted herbs to 1.5 m tall; stems branched, proximal stems sometimes decumbent, leafy mostly in distal half; herbage stipitate-glandular. **Leaves**: basal usually absent at anthesis; cauline usually deeply pinnatilobed and lanceolate in outline, chartaceous. **Capitula** radiate; involucre 7–10 × 10–17 mm, hemispherical; phyllaries 64–134, linear-lanceolate, apices spreading to reflexed; receptacle 8–11 mm diam. **Ray florets** 40–60; corolla 11–15 mm long. **Disk florets** 80–150+; corolla 4.5–6 mm long. **Cypselae** ca. 2.5 mm long, rays pappose. $2n = 10$.

Distribution. Mexico (Chihuahua, Coahuila); 1100–1300 meters elevation.

EXCLUDED SPECIES

Leucosyris spinosa (Benth.) Greene, Pittonia 3: 244. (9 Dec) 1897. Basionym: *Aster spinosus* Benth. ≡ *Chloracantha spinosa* (Benth.) G.L. Nesom, Phytologia 70: 378. 1991.

ACKNOWLEDGEMENTS

We would like to thank Guy Nesom, Rosa del Carmen Ortiz, George Yatskievych, and James Zarucchi for help and for reading and reviewing the manuscript. We are grateful to Stephanie Keil for taking the specimen photographs.

LITERATURE CITED

Arnold, M.L. and R.C. Jackson. 1978[1979]. Biochemical, cytogenetic and morphological relationships of a new species of *Machaeranthera* sect. *Arida* (Compositae). Syst. Bot. 3: 208–217.

Bentham, G. and J.D. Hooker. 1873. Compositae. Pp. 163–533 *in* Genera Plantarum, Vol. 2. Reeve and Co., London.

Blake, S.F. 1925. Asteraceae. Aster Family. Pp. 521–632 *in* I. Tidestrom, Flora of Utah and Nevada. Contr. U.S. Natl. Herb. 25: 1–665 + pl. 1–15.

Blake, S.F. 1942. Compositae. Sunflower Family. Pp. 869–1033 *in* T.H. Kearney, R.H. Peebles, and collaborators, Flowering Plants and Ferns of Arizona. U.S. Govt. Printing Office, Washington.

Brown, R.W. 1956. Composition of Scientific Words: A Manual of Methods and a Lexicon of Materials for the Practice of Logotechnics (rev. ed.). Smithsonian, Washington.

Candolle, A.P. de. 1836. Prodromus Systematis Naturalis Regni Vegetabilis, Vol. 5. Treuttel and Würtz, Paris.

Cronquist, A. 1994. Asteraceae. Pp. 5–471 *in* A. Cronquist et al. (eds.), Intermountain Flora. Vascular Plants of the Intermountain West, U.S.A., Vol. 5. New York Botanical Garden, Bronx.

Cronquist, A.J. and D.D. Keck. 1957. A reconstitution of the genus *Machaeranthera*. Brittonia 9: 231–239.

Felger, R.S. 2000. Flora of the Gran Desierto and Río Colorado of Northwestern Mexico. Univ. of Arizona Press, Tucson.

Ferris, R.S. 1960. Bignoniaceae to Compositae *in* L. Abrams and R.S. Ferris, Illustrated Flora of the Pacific States: Washington, Oregon, and California, Vol. 4. Stanford Univ. Press, Stanford.

Gandhi, K.N. and R.D. Thomas. 1989. Asteraceae of Louisiana. Sida Bot. Misc. 4: xii + 1–202.

Gray, A. 1849. Plantae Fendlerianae Novi-Mexicanae. Mem. Amer. Acad. Arts, n.s. 4(1): 1–116.

Gray, A. 1852. Plantae Wrightianae texano-neo-mexicanae: An account of a collection of plants made by Charles Wright. Smithsonian Contr. Knowl. 3(5): 1–146 + pl. 1–10.

Gray, A. 1853. Plantae Wrightianae texano-neo-mexicanae: Part II. An account of a collection of plants made by Charles Wright. Smithsonian Contr. Knowl. 5(6): 1–119 + pl. 11–14.

Gray, A. 1884. Compositae. Pp. 48–444 *in* Synoptical Flora of North America, Vol. 1. American Book Company, New York.

Greene, E.L. 1896. Studies in the Compositae.–III. Pittonia 3: 43–66.

Greene, E.L. 1897a. Flora Franciscana: An Attempt to Classify and Describe the Vascular Plants of Middle California, Part 4. Cubery, San Francisco.

Greene, E.L. 1897b. Studies in the Compositae.–VI. Pittonia 3: 243–246.

Greene, E.L. 1899. Notes on *Machaeranthera*. Pittonia 4: 22–25.

Hall, H.M. 1907. Compositae of Southern California. Univ. Calif. Publ. Bot. 3: 1–302.

Hartman, R.L. 1976 A conspectus of *Machaeranthera* (Compositae: Astereae) and a biosystematic study of the section *Blepharodon*. Ph.D. thesis. Univ. of Texas, Austin.

Hartman, R.L. 1990. A conspectus of *Machaeranthera* (Asteraceae: Astereae). Phytologia 68: 439–465.

Hartman, R.L. and D.J. Bogler. 2006. *Arida*. Pp. 401–405 *in* Flora of North America Editorial Committee (eds.), Flora of North America, Vol. 20. Oxford Univ. Press, New York.

Hyam, R. and R. Pankhurst. 1995. Plants and Their Names: A Concise Dictionary. Oxford Univ. Press, Oxford.

Ivey, R.D. 2003. Flowering plants of New Mexico (ed. 4). Ivey Publishers, Albuquerque.

Jackson, W.P.U. 1987. Origins and Meanings of South African Plant Genera. Univ. Cape Town, Cape Town.

Jepson, W.L. 1925. Compositae. Sunflower Family. Pp. 979–1169 *in* A Manual of the Flowering Plants of California. Associated Student's Store, Berkeley.

Jones, A.G. 1980. A classification of the New World species of *Aster* (Asteraceae). Brittonia 32: 230–239.

Jones, A.G. 1983. Nomenclatural transfer from *Aster* to *Machaeranthera* (Asteraceae). Syst. Bot. 8: 85.

Keil, D.J. et al. 1993. Asteraceae [Compositae] Sunflower Family. Pp. 174–360, 361, 365 *in* J.C. Hickman (ed.), The Jepson Manual: Higher Plants of California. Univ. of California Press, Berkeley.

Keil, D.J. et al. 2012. Asteraceae (Compositae) Sunflower Family. Pp. 211–443, 445 *in* B.G. Baldwin et al. (eds.), The Jepson Manual: Vascular Plants of California (ed. 2). Univ. of California Press, Berkeley.

Martin, W.C. and C.R. Hutchins. 1988. Fall Wildflowers of New Mexico. Univ. of New Mexico, Albuquerque.

McVaugh, R. 1984. Compositae. Fl. Novo-Galiciana 12: 1–1157.

Morgan, D.R. 1993. A molecular systematic study and taxonomic revision of *Psilactis* (Asteraceae: Astereae). Syst. Bot. 18: 290–308.

Morgan, D.R. and R.L. Hartman. 2003. A synopsis of *Machaeranthera* (Asteraceae: Astereae), with recognition of segregate genera. Sida 20: 1837–1416.

Munz, P.A. 1974. A Flora of Southern California. Univ. of California Press, Berkeley.

Munz, P.A. and D.D. Keck. 1959. A California Flora. Univ. of California Press, Berkeley.

Nees ab Esenbeck, C.G. 1832. Genera et Species Asterearum. Nuremberg.

Nesom, G.L. 1989. *Aster intricatus* (Asteraceae: Astereae) transferred to *Machaeranthera*. Phytologia 67: 338–440.

Nesom, G.L., L.A. Vorobik, and R.L. Hartman. 1990. The identity of *Aster blepharophyllus* (Asteraceae: Astereae). Syst. Bot. 15: 638–642.

Nesom, G.L., Y. Suh, D.R. Morgan, S.D. Sundberg, and B.B. Simpson. 1991. *Chloracantha*, a new genus of North American Astereae (Asteraceae). Phytologia 70: 371–381.

Nesom, G. and H. Robinson. 2007[2006]. Astereae Cass. (1819). Pp. 284–342 *in* K. Kubitzki (ed.), The Families and Genera of Vascular Plants, Vol. 8. Springer, Berlin.

Semple, J.C. and L. Brouillet. 1980. A synopsis of North American Asters: the subgenera, sections and subsections of *Aster* and *Lasallea*. Amer. J. Bot. 67: 1010–1026.

Shinners, L.H. 1950. Notes on Texas Compositae–V. Field & Lab. 18: 32–42.

Shreve, F. and I.L. Wiggins. 1964. Vegetation and Flora of the Sonoran Desert, Vol. 2. Stanford Univ. Press, Stanford.

Stearn, W.T. 1968. Humboldt, Bonpland, Kunth and Tropical America Botany. Cramer, Stuttgart.

Stucky, J. 1978. Hybridization between *Aster* and *Machaeranthera* and its taxonomic significance. Amer. J. Bot. 65: 125–133.

Sundberg, D.S. 1986. The systematics of *Aster* subg. *Oxytripolium* (Compositae) and historically allied species. Ph.D. thesis. Univ. of Texas, Austin.

Tidestrom, I. and T. Kittell. 1941. A Flora of Arizona and New Mexico. Catholic Univ., Washington.

Turner, B.L., J. Bacon, and T. Wendt. 1975. Chromosomes and phyletic position of *Aster sonorae* Gray (Asteraceae—sect. *Oxytripolium*). Southw. Naturalist 19: 361–364.

Turner, B.L. and D.B. Horne. 1964. Taxonomy of *Machaeranthera* sect. *Psilactis* (Compositae-Astereae). Brittonia 16: 316–331.

Turner, B.L. and G.L. Nesom. 2003. A new species of *Arida* (*Machaeranthera* sect. *Arida*-Asteraceae: Astereae) from Trans-Pecos Texas. Sida 20: 1417–1422.

Wiggins, I.L. 1980. Flora of Baja California. Stanford Univ. Press, Stanford.

Wooton, E.O. and P.C. Standley. 1915. Flora of New Mexico. Contr. U.S. Natl. Herb. 19: 1–794.